# Serial EEPROM of HN58X25xxx Series

## Control Using Clock Synchronous SCI of Renesas SH

### Introduction

This document should be used for reference when implementing control of the HN58X25xxx Series serial EEPROM manufactured by Renesas Technology Corp., using the clock synchronous serial communication interface (hereafter referred to as SCI) of the SuperH family manufactured by Renesas Technology Corp.

The SuperH family incorporates a clock synchronous SCI. The HN58X25xxx Series serial EEPROM can be controlled through the clock synchronous SCI and software.

This document describes sample programs for controlling the HN58X25xxx Series serial EEPROM by using the clock synchronous SCI.

### Target Device

The application examples described in this document are applicable when the following MCU and condition are used.

- MCU: SuperH family
- Condition: Clock synchronous SCI is used

The programs can be executed by any SuperH family MCU with the SCI. Note however that since some functions may be altered by function addition, etc., the functions should be confirmed against the MCU manual.

Be sure to perform evaluation sufficiently when using this application note.

### Contents

1. Control Method for HN58X25xxx Series Serial EEPROM ..... 2

2. Sample Programs ..... 6

# 1. Control Method for HN58X25xxx Series Serial EEPROM

## 1.1 Overview of Operation

Control of the HN58X25xxx Series serial EEPROM is implemented by using the clock synchronous SCI in the SuperH.

The connection method is described below.

The sample programs execute the following control operations.

- Connects the S# pin of the serial EEPROM to a SuperH port and controls it using output of the SuperH general port.
- Controls data input/output by the clock synchronous SCI (using the internal clock).

Refer to the data sheets of the MCU and serial EEPROM and specify a usable clock frequency.

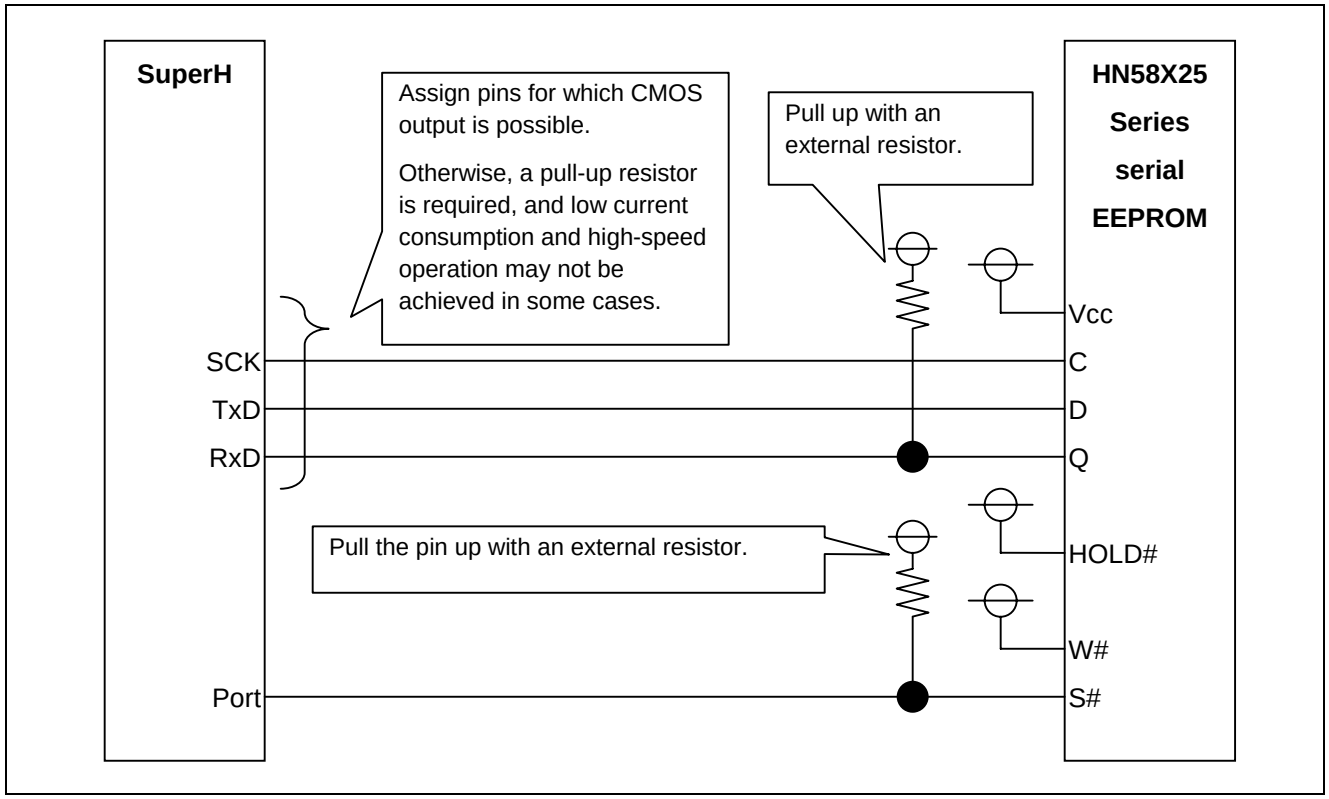
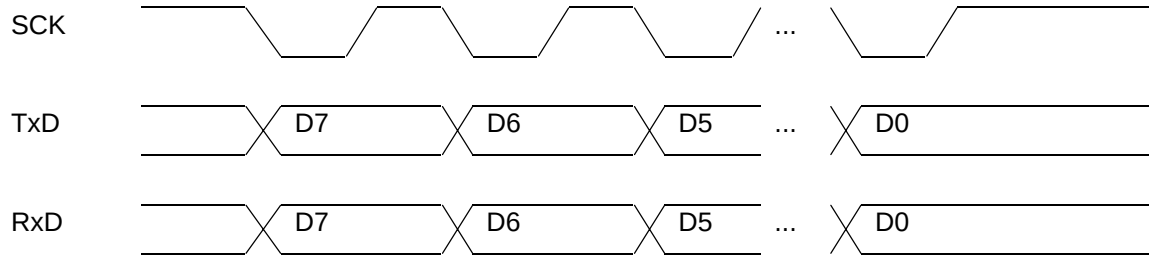



**Figure 1.1 Serial EEPROM Connection Example**

## 1.2 Signal Timing Generation of Clock Synchronous SCI

Signals are generated at the following timing to satisfy the serial EEPROM timing.




- Transmission from MCU to serial EEPROM: Transmit data output at fall of transfer clock
- Reception from serial EEPROM to MCU: Receive data input at rise of transfer clock
- Transfer in MSB-first

The SCK pin level is high when transfer is not taking place.

**Figure 1.2 Timing for Clock Synchronous SCI of SuperH**

Check the data sheets of the MCU and serial EEPROM for the maximum clock frequency that can be used.

## 1.3 Control of S# Pin of Serial EEPROM

The S# pin of the serial EEPROM is connected to a SuperH port and controlled using output of the SuperH general port.

The period from the falling edge of the S# pin (port of SuperH) of the serial EEPROM to the falling edge of the C pin (SCK of SuperH) is controlled by inserting software wait cycles.

The period from the rising edge of the C pin (SCK of SuperH) to the rising edge of the S# pin (port of SuperH) is controlled by inserting software wait cycles.

Check the data sheet of the serial EEPROM and set the software wait time according to the system.

## 1.4 MCU Hardware Resources in Use

The hardware resources to be used are shown below.

**Table 1.1 Hardware Resources in Use**

| Resource in Use | Number of Used Resources |
|---|---|
| Clock synchronous SCI | One channel (essential) |
| Port (for control of the S# pin of serial EEPROM) | One port (essential) |

MSB-first is specified for an MCU for which MSB-first is allowed.

Endian conversion is performed through software in an MCU that supports only LSB-first.

## 1.5 SuperH Register Setting (Clock Synchronous SCI)

Set up the clock synchronous SCI as shown below to satisfy the serial EEPROM specifications/timing.

A setting example in which the FIFO is not used is shown below.

### 1.5.1 SH7206

An example of setting the SCIF based on the register descriptions in the SH7206 Group Hardware Manual Rev. 1.00 is shown in the table below.

**Table 1.2 Clock Synchronous SCI Mode Settings**

| Register | Bit | Function and Setting |
|---|---|---|
| SCFRDR | 7 to 0 | The receive data is read from these bits. |
| SCFTDR | 7 to 0 | Set the transmit data in these bits. |
| SCSMR | 15 to 8 | Reserved<br>These bits are always read as 0. The write value should always be 0. |
| | C/A# | Write 1 to this bit (clock synchronous mode). |
| | CHR | Write 0 to this bit.<br>Since clock synchronous mode is selected, the data length is fixed at 8 bits. |
| | PE | Write 0 to this bit.<br>Since clock synchronous mode is selected, parity bit addition and checking is disabled |
| | O/E# | Write 0 to this bit.<br>Since clock synchronous mode is selected, this bit setting is invalid. |
| | STOP | Write 0 to this bit.<br>Since clock synchronous mode is selected, this bit setting is invalid. |
| | 2 | Reserved<br>This bit is always read as 0. The write value should always be 0. |
| | CKS1, CKS0 | Select the clock source in these bits. |
| SCSCR | 15 to 8 | Reserved<br>These bits are always read as 0. The write value should always be 0. |
| | TIE | Write 0 to this bit. |
| | RIE | Write 0 to this bit. |
| | TE | Write 1 to this bit at transmission and reception. |
| | RE | Write 1 to this bit at reception. |
| | REIE | Write 0 to this bit. |
| | 2 | Reserved<br>This bit is always read as 0. The write value should always be 0. |
| | CKE1, CKE0 | Write 00 to these bits (internal clock/SCK pin functions as input pin (input signal is ignored)). |

| Register | Bit | Function and Setting |
|---|---|---|
| SCFSR | PER3 to PER0 | The status is read from these bits. |
| | FER3 to FER0 | The status is read from these bits. |
| | ER | The status is read from this bit. 0 is written to this bit at initialization. |
| | TEND | The status is read from this bit. 0 is written to this bit at initialization. |
| | TDFE | The status is read from this bit. 1 is written to this bit at initialization but it is not for the purpose of clearing this bit. |
| | BRK | The status is read from this bit. 0 is written to this bit at initialization. |
| | FER | The status is read from this bit. |
| | PER | The status is read from this bit. |
| | RDF | The status is read from this bit. 0 is written to this bit at initialization. |
| | DR | The status is read from this bit. 0 is written to this bit at initialization. |
| SCBRR | 7 to 0 | Set the transfer speed in these bits. |
| SCFCR | 15 to 11 | Reserved<br>These bits are always read as 0. The write value should always be 0. |
| | RSTRG2 to RSTGR0 | Write 000b to these bits. |
| | RTRG1, RTRG0 | Write 00b to these bits. |
| | TTRG1, TTRG0 | Write 11b to these bits. |
| | MCE | Write 0 to this bit. |
| | TFRST | 1 is written to this bit at initialization.<br>Write 0 to this bit at transmission and reception. |
| | RFRST | 1 is written to this bit at initialization.<br>Write 0 to this bit at reception. |
| | LOOP | Write 0 to this bit. |
| SCFDR | 15 to 13 | Reserved<br>These bits are always read as 0. The write value should always be 0. |
| | T4 to T0 | These bits indicate the number of untransmitted data bytes. |
| | 7 to 5 | Reserved<br>These bits are always read as 0. The write value should always be 0. |
| | R4 to R0 | These bits indicate the number of receive data bytes. |
| SCSPTR | 15 to 8 | Reserved<br>These bits are always read as 0. The write value should always be 0. |
| | RTSIO | 0 is written to this bit at initialization. |
| | RTSDT | 0 is written to this bit at initialization. |
| | CTSIO | 0 is written to this bit at initialization. |
| | CTSDT | 0 is written to this bit at initialization. |
| | SCKIO | 0 is written to this bit at initialization. |
| | SCKDT | 0 is written to this bit at initialization. |
| | SPB2IO | 0 is written to this bit at initialization. |
| | SPB2DT | 0 is written to this bit at initialization. |

## 2. Sample Programs

Two or more of the same devices can be connected to the serial bus and controlled.

The sample programs execute the following:

- Data read processing
- Data write processing
- Write-protection processing through software protection
- Status read processing

### 2.1 Overview of Software Operations

The operations roughly described below are performed.

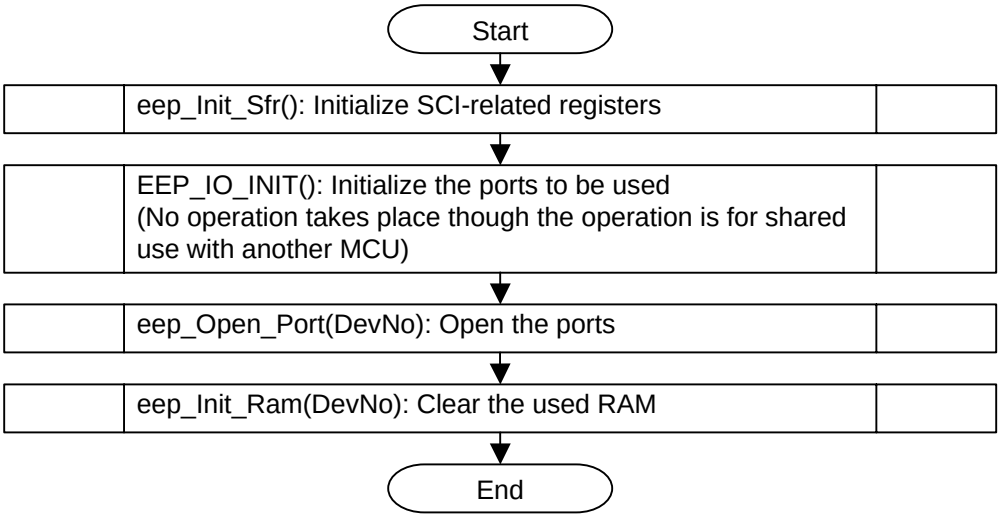
(1) The driver initialization processing acquires the resources to be used by the driver and initializes them.
At this point, the pins connected to the serial EEPROM are as follows:
S pin: The MCU is set to input mode
SCK pin: The MCU is set to input mode
TxD pin: The MCU is set to input mode
RxD pin: The MCU is set to input mode; high-level input by an external pull-up resistor

(2) Function calls perform the following operations.
1. Execute the processing of each function.
2. The pins connected to the serial EEPROM are as follows:
S pin: The MCU is set to input mode
SCK pin: The MCU is set to input mode
TxD pin: The MCU is set to input mode
RxD pin: The MCU is set to input mode; high-level input by an external pull-up resistor

## 2.2 Detailed Description of Functions

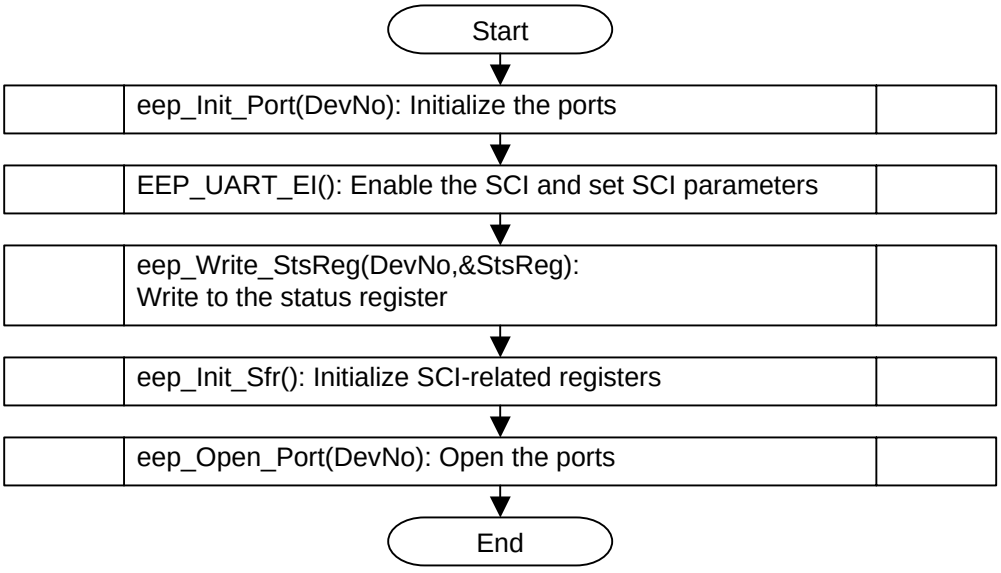
### 2.2.1 Driver Initialization Processing

| **Function Name** |
|---|
| EEPROM driver initialization processing<br>void eep_Init_Driver(void) |
| **Arguments** |
| None |
| **Return Values** |
| None |
| **Operations** |
| • Initializes the EEPROM driver.<br>• Initializes the SFR for EEPROM control.<br>• Performs the following processing for each device.<br>(a) Opens the EEPROM control ports.<br>(b) Initializes the EEPROM control RAM.<br>• Call this function once at system activation. |
| **Notes** |
| None |


Start
eep_Init_Sfr(): Initialize SCI-related registers
EEP_IO_INIT(): Initialize the ports to be used
(No operation takes place though the operation is for shared use with another MCU)
eep_Open_Port(DevNo): Open the ports
eep_Init_Ram(DevNo): Clear the used RAM
End

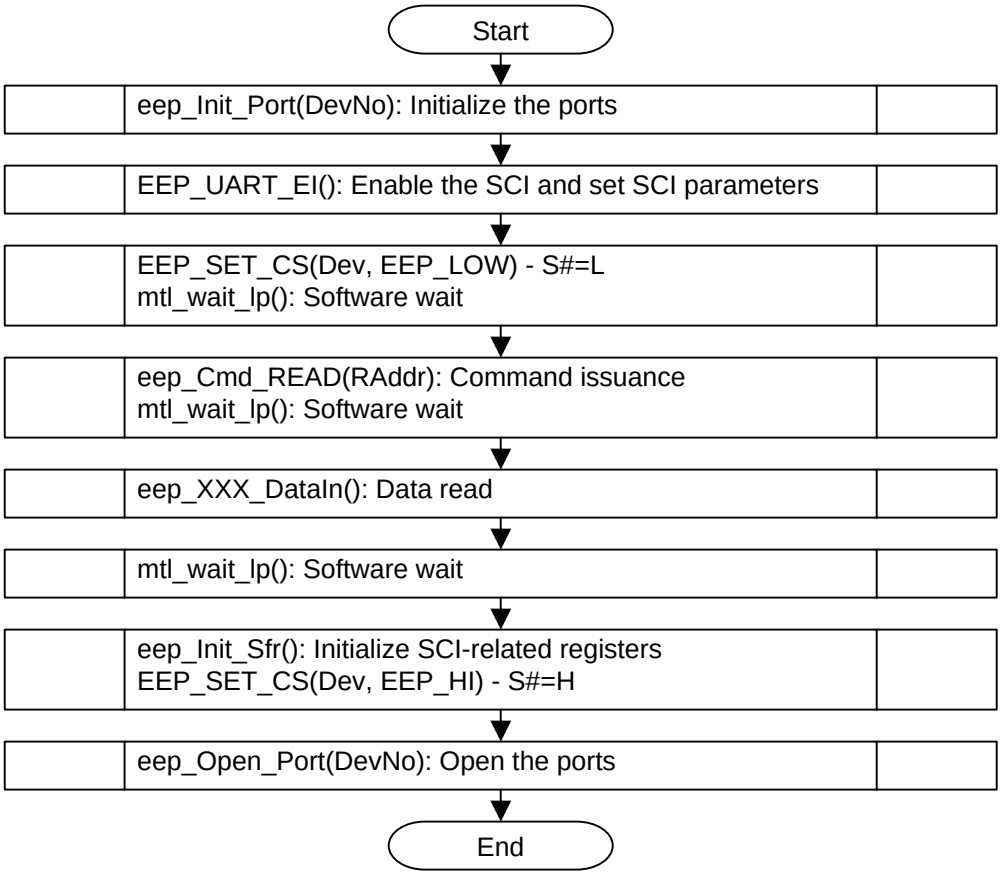
### 2.2.2 Write-Protection Setting Processing

| **Function Name** | | | |
|---|---|---|---|
| Write-protection setting processing<br>signed short eep_Write_Protect(unsigned char DevNo, unsigned char WpSts) | | | |
| **Arguments** | | | |
| unsigned char | DevNo | ; | Device number |
| unsigned char | WpSts | ; | Write-protection setting data |
| **Return Values** | | | |
| Returns the write-protection setting result. | | | |
| EEP_OK | | ; | Successful operation |
| EEP_ERR_PARAM | | ; | Parameter error |
| EEP_ERR_OTHER | | ; | Other error |
| **Operations** | | | |
| • Makes the write-protection setting.<br>• Set the write-protection setting data (WpSts) as follows:<br>EEP_WP_NONE ; No protection<br>EEP_WP_UPPER_QUART ; Upper-quarter protection setting<br>EEP_WP_UPPER_HALF ; Upper-half protection setting<br>EEP_WP_WHOLE_MEM ; Whole memory protection setting | | | |
| **Notes** | | | |
| None | | | |



### 2.2.3 Data Read Processing

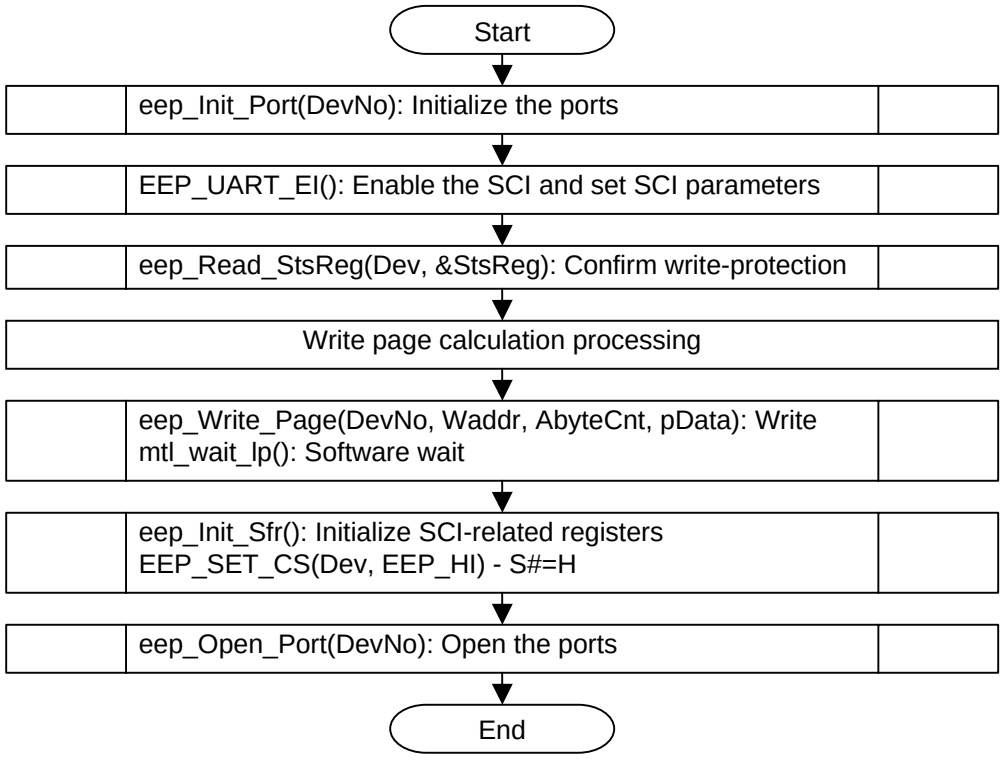
| **Function Name** | | | |
|---|---|---|---|
| Data read processing<br>signed short eep_Read_Data(unsigned char DevNo, unsigned short RAddr, unsigned short RCnt, unsigned char * pData) | | | |
| **Arguments** | | | |
| unsigned char | DevNo | ; | Device number |
| unsigned short | RAddr | ; | Read start address |
| unsigned short | RCnt | ; | Number of bytes to be read |
| unsigned char FAR* | pData | ; | Read data storage buffer pointer |
| **Return Values** | | | |
| Returns the read result. | | | |
| EEP_OK | | ; | Successful operation |
| EEP_ERR_PARAM | | ; | Parameter error |
| EEP_ERR_HARD | | ; | Hardware error |
| EEP_ERR_OTHER | | ; | Other error |
| **Operations** | | | |
| • Reads data from EEPROM in bytes.<br>• Reads data from the specified address for the specified number of bytes. | | | |
| **Notes** | | | |
| • The maximum write address is EEPROM size – 1. | | | |



### 2.2.4 Data Write Processing

| **Function Name** | | | |
|---|---|---|---|
| Data write processing<br>signed short eep_Write_Data(unsigned char DevNo, unsigned short WAddr, unsigned short WCnt, unsigned char FAR* pData) | | | |
| **Arguments** | | | |
| unsigned char | DevNo | ; | Device number |
| unsigned short | WAddr | ; | Write start address |
| unsigned short | WCnt | ; | Number of bytes to be written |
| unsigned char FAR* | pData | ; | Write data storage buffer pointer |
| **Return Values** | | | |
| Returns the write result. | | | |
| EEP_OK | | ; | Successful operation |
| EEP_ERR_PARAM | | ; | Parameter error |
| EEP_ERR_HARD | | ; | Hardware error |
| EEP_ERR_WP | | ; | Write-protection error |
| EEP_ERR_OTHER | | ; | Other error |
| **Operations** | | | |
| • Writes data to EEPROM in bytes.<br>• Writes data from the specified address for the specified number of bytes. | | | |
| **Notes** | | | |
| • EEPROM can be written to only when write-protection has been canceled.<br>• The maximum write address is EEPROM size – 1. | | | |

In a write to the serial EEPROM, the page rewrite method is used. The original data is divided into the page-unit data and then written to the EEPROM.



### 2.2.5 Status Read Processing

| **Function Name** | | | |
|---|---|---|---|
| Status read processing<br>signed short eep_Read_Status(unsigned char DevNo, unsigned char * pStatus) | | | |
| **Arguments** | | | |
| unsigned char | DevNo | ; | Device number |
| unsigned char FAR* | pStatus | ; | Read status storage buffer |
| **Return Values** | | | |
| Returns the status register acquisition result. | | | |
| EEP_OK | | ; | Successful operation |
| EEP_ERR_PARAM | | ; | Parameter error |
| EEP_ERR_HARD | | ; | Hardware error |
| EEP_ERR_OTHER | | ; | Other error |
| **Operations** | | | |

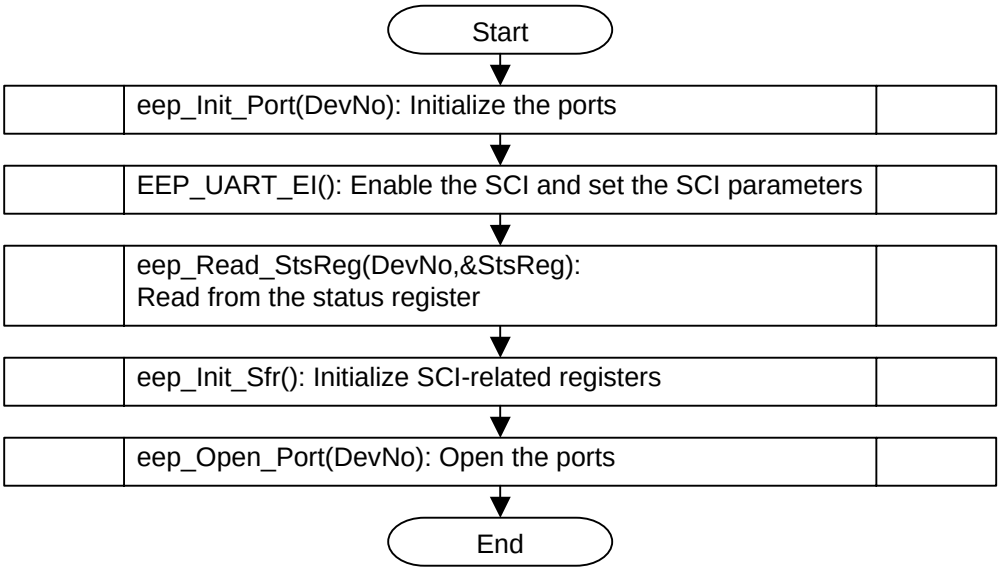
- Reads the status.
  Reads from the status register.
- The following information is stored in the read status storage buffer (pStatus).
  Memory size ≤ 512 bytes

| | | |
|---|---|---|
| Bits 7 to 4: | Reserved (All 1) | |
| Bits 3, 2: | BP1, BP0 | 00: No protection<br>01: Upper-quarter protection<br>10: Upper-half protection<br>11: Whole memory protection |
| Bit 1: | WEL | 0: Write disabled<br>1: Write enabled |
| Bit 0: | WIP | 1: During write operation |

  Memory size > 512 bytes

| | | |
|---|---|---|
| Bit 7: | SRWD | 0: Status register can be changed<br>1: Status register cannot be changed |
| Bits 6 to 4: | Reserved (All 0) | |
| Bits 3, 2: | BP1, BP0 | 00: No protection<br>01: Upper-quarter protection<br>10: Upper-half protection<br>11: Whole memory protection |
| Bit 1: | WEL | 0: Write disabled<br>1: Write enabled |
| Bit 0: | WIP | 1: During write operation |

| **Notes** |
|---|
| None |




## 2.3 Return Value Definition

```
#define EEP_OK          (signed short)( 0)   /* Successful operation      */
#define EEP_ERR_PARAM   (signed short)(-1)   /* Parameter error           */
#define EEP_ERR_HARD    (signed short)(-2)   /* Hardware error            */
#define EEP_ERR_WP      (signed short)(-3)   /* Write-protection error    */
#define EEP_ERR_OTHER   (signed short)(-4)   /* Other error            */
```

## 2.4 User Setting Examples

Setting examples when using the Renesas Technology MCU SH7206 are shown below.

The location where a setting should be made is indicated by the comment of /** SET **/ in each file.

### 2.4.1 eep.h

(1) Definition of the number of devices used and device numbers

Specify the number of devices to be used and assign a number for each device.
In the example below, one device is used and 0 is assigned as the device number.
When using three or more, eep_io.h needs to be modified in addition to this file.

```
/*------------------------------------------------------------------------------*/
/*  Define the number of the required serial EEPROM devices.(1 to N devices)    */
/*  Define the device number in accordance with the number of serial EEPROM     */
/*  devices to be connected.                                                    */
/*------------------------------------------------------------------------------*/
/* Define number of devices */
#define EEP_DEV_NUM           1  /* 1 device                                    */

/* Define No. of slots */
#define EEP_DEV0          0      /* Device 0                                    */
#define EEP_DEV1          1      /* Device 1                                    */
```

(2) Definition of size of device used

Specify the size of the device to be used.
In the example below, a 256-Kbit device is used.

```
/*------------------------------------------------------------------------- */
/*  Define the serial EEPROM device.                                        */
/*------------------------------------------------------------------------- */
/*#define EEP_SIZE_002K       /*   2 Kbits(256 bytes)                       */
/*#define EEP_SIZE_004K       /*   4 Kbits(512 bytes)                       */
/*#define EEP_SIZE_008K       /*   8 Kbits(  1 Kbyte)                       */
/*#define EEP_SIZE_016K       /*  16 Kbits(  2 Kbytes)                      */
/*#define EEP_SIZE_032K       /*  32 Kbits(  4 Kbytes)                      */
/*#define EEP_SIZE_064K       /*  64 Kbits(  8 Kbytes)                      */
/*#define EEP_SIZE_128K       /* 128 Kbits( 16 Kbytes)                      */
#define EEP_SIZE_256K         /* 256 Kbits( 32 Kbytes)                      */
```

### 2.4.2 eep_sfr.h

(1) Definition of header

Specify the header corresponding to the MCU to be used.
In the example below, the SH7206 is used.
If the header is not included, add the header and also create eep_sfr.h.xxx for each MCU with reference to the provided program.

```
//#include "Eep_sfr.h.3029"   /* EEPROM driver SFR common definitions      */
//#include "Eep_sfr.h.36049"  /* EEPROM driver SFR common definitions      */
//#include "Eep_sfr.h.36064"  /* EEPROM driver SFR common definitions      */
//include "Eep_sfr.h.38024"   /* EEPROM driver SFR common definitions      */
//#include "Eep_sfr.h.38076"  /* EEPROM driver SFR common definitions      */
//#include "Eep_sfr.h.2378"   /* EEPROM driver SFR common definitions      */
//#include "Eep_sfr.h.1657"   /* EEPROM driver SFR common definitions      */
//#include "Eep_sfr.h.1650"   /* EEPROM driver SFR common definitions      */
//#include "Eep_sfr.h.7149"   /* EEPROM driver SFR common definitions      */
#include "Eep_sfr.h.7206"     /* EEPROM driver SFR common definitions      */
```

### 2.4.3 eep_sfr.h.xxx (File Prepared for Each Group)

The sample program shows a description example in which channel 0 is used as the resource of the clock synchronous SCI.

No setting needs to be modified when the above resource is used.

(1) UART resource

```
/*-------------------------- UART definitions ------------------------------------*/
#ifdef EEP_UART_USED
#define EEP_UART_MSTP   CPG.STBCR4.BIT.MSTP44   /* UART module stop control flag     */

#define EEP_UART_SMR    SCIF3.SCSMR.WORD        /* UART serial mode register         */
#define EEP_UART_SCR    SCIF3.SCSCR.WORD        /* UART serial control register      */
#define EEP_UART_FSR    SCIF3.SCFSR.WORD        /* UART serial status register       */
#define EEP_UART_BRR    SCIF3.SCBRR.BYTE        /* UART bit rate register            */
#define EEP_UART_FCR    SCIF3.SCFCR.WORD        /* UART FIFO control register        */
#define EEP_UART_SPTR   SCIF3.SCSPTR.WORD       /* UART serial port register         */
#define EEP_UART_LSR    SCIF3.SCLSR.WORD        /* UART line status register         */
#define EEP_UART_TXBUF  SCIF3.SCFTDR.BYTE       /* UART transmit FIFO data register  */
#define EEP_UART_RXBUF  SCIF3.SCFRDR.BYTE       /* UART receive FIFO data register   */

#define EEP_UART_ORER   SCIF3.SCLSR.BIT.ORER    /* UART overrun error flag           */

#define EEP_UART_TXEND  SCIF3.SCFSR.BIT.TEND    /* UART transmit end flag            */
#define EEP_UART_TXNEXT SCIF3.SCFSR.BIT.TDFE    /* UART transmit FIFO data empty     */
#define EEP_UART_RXNEXT SCIF3.SCFSR.BIT.RDF     /* UART receive FIFO data full       */
```

If another resource is used, make additions or modify the above program. Accordingly, also make additions or modify the /* UART setting */ definition with reference to section 1.5, SuperH Register Setting (Clock Synchronous SCI).

### 2.4.4 eep_io.h

(1) Definition of header

Specify the header corresponding to the MCU to be used.
In the example below, the SH7206 is used.
If the header is not included, add the header and also create eep_io.h.xxx for each MCU with reference to the provided program.

```
//#include "Eep_io.h.3029"    /* EEPROM driver I/O module common definitions       */
//#include "Eep_io.h.36049"   /* EEPROM driver I/O module common definitions       */
//#include "Eep_io.h.36064"   /* EEPROM driver I/O module common definitions       */
//#include "Eep_io.h.38024"   /* EEPROM driver I/O module common definitions       */
//#include "Eep_io.h.38076"   /* EEPROM driver I/O module common definitions       */
//#include "Eep_io.h.2378"    /* EEPROM driver I/O module common definitions       */
//#include "Eep_io.h.1657"    /* EEPROM driver I/O module common definitions       */
//#include "Eep_io.h.1650"    /* EEPROM driver I/O module common definitions       */
//#include "Eep_io.h.7149"    /* EEPROM driver I/O module common definitions       */
#include "Eep_io.h.7206"      /* EEPROM driver I/O module common definitions       */
```

### 2.4.5 eep_io.h.xxx (File Prepared for Each Group)

(1) Definition of resources used by UART of MCU used

Specify the resources of the MCU to be used.

In the example below, the clock synchronous SCI is used.

```
/*------------------------------------------------------------------------- */
/*  Define the combination of the MCU's resources.                          */
/*------------------------------------------------------------------------- */
#define EEP_OPTION_1             /* Low speed      */          /* UART     */
```

(2) Definition of control ports of MCU used

Specify the control ports of the MCU to be used.

In the example below, RxD, TxD, and SCK of the clock synchronous SCI and CS# are assigned.

When two devices are connected, make a definition regarding CS1.

When using three or more, eep.h needs to be modified in addition to this file.

```
/*-------------------------------------------------------------------------------*/
/*  Define the control port.                                                     */
/*-------------------------------------------------------------------------------*/

#define EEP_P_DATAO     PORT.PEDRL.BIT.PE12DR      /* EEP DataOut                */
#define EEP_P_DATAI     PORT.PEDRL.BIT.PE11DR      /* EEP DataIn                 */
#define EEP_P_CLK       PORT.PEDRL.BIT.PE9DR       /* EEP CLK                    */
#define EEP_D_DATAO     PORT.PEIORL.BIT.PE12IOR    /* EEP DataOut                */
#define EEP_D_DATAI     PORT.PEIORL.BIT.PE11IOR    /* EEP DataIn                 */
#define EEP_D_CLK       PORT.PEIORL.BIT.PE9IOR     /* EEP CLK                    */
#define EEP_PCR_DATAO   PORT.PECRL4.BIT.PE12MD     /* EEP DataOut                */
#define EEP_PCR_DATAI   PORT.PECRL3.BIT.PE11MD     /* EEP DataIn                 */
#define EEP_PCR_CLK     PORT.PECRL3.BIT.PE9MD      /* EEP CLK                    */

#define EEP_P_CS0       PORT.PEDRL.BIT.PE15DR      /* EEP CS0 (Negative-true logic)  */
#define EEP_D_CS0       PORT.PEIORL.BIT.PE15IOR    /* EEP CS0 (Negative-true logic)  */
#define EEP_PCR_CS0     PORT.PECRL4.BIT.PE15MD     /* EEP CS0 (Negative-true logic)  */
#if (EEP_DEV_NUM > 1)
#define EEP_P_CS1                                  /* EEP CS1 (Negative-true logic)  */
#define EEP_D_CS1                                  /* EEP CS1 (Negative-true logic)  */
#define EEP_PCR_CS1                                /* EEP CS1 (Negative-true logic)  */
#endif /* #if (EEP_DEV_NUM > 1) */
```

### 2.4.6 mtl_com.h (Common Header File)

(1) Definition of header

Specify the header corresponding to the MCU to be used.
In the example below, the SH7206 is used.
If the header is not included, add the header and also create mtl_com.h.xxx for each MCU with reference to the provided program.

```
#include "mtl_com.h.7206"
```

### 2.4.7 mtl_com.h.xxx (File Prepared for Each Group)

Setting examples when using the SH7206 are shown below.

(1) Definition of OS header file

This software is an OS-independent program.
In the example below, the OS is not used.

```
/* Include an OS header file with a prototype declaration    */    /** SET **/
/* because wai_sem/sig_sem/dly_tsk is used.                  */    /** SET **/
/* The define and include statements below should be         */    /** SET **/
/* comments when the OS is not used.                         */    /** SET **/
//#define MTL_OS_USE       /* OS usage                      */    /** SET **/
//#include <mr30.h>        /* OS include file               */    /** SET **/
```

(2) Definition of header file specifying common access area

Includes the header file in which the MCU registers are defined.
This file needs to be included because it is mainly used by the device driver for controlling the ports.
In the example below, the SH7206 header file is included. Include the header file in accordance with the MCU.

```
/* Include the header file containing the define statement   */    /** SET **/
/* for the I/O periphery because the define value of the     */    /** SET **/
/* SFR area of the MCU is used.                              */    /** SET **/
#include "7206.h"            /* SH7206 include file          */    /** SET **/
```

(3) Definition of endian type

This is a setting for another purpose. Do not modify the definition.

```
/* Specify the endian type of the MCU used.                                    */     /** SET **/
/* When big endian is specified, little endian definition should be a comment. */     /** SET **/
//#define MTL_MCU_LITTLE                    /* Little endian                  */     /** SET **/
```

(4) Specification of standard library type used

This is a setting for another purpose. Do not modify the specification.

```
/* Specify the standard library type used.                                     */     /** SET **/
/* When the processing below is used in the library provided with the          */     /** SET **/
/* compiler, the define statement below should be a comment.                   */     /** SET **/
/* memcmp() / memcpy() / memset() / strcat() / strcmp() / strcpy() / strlen()  */     /** SET **/
//#define MTL_USER_LIB                      /* Optimized library usage        */     /** SET **/
```

(5) Definition of RAM area accessed by processing group used

Define MTL_MEM_NEAR for the SuperH family.

```
/* Define the RAM area accessed by the processing group used.   */ /** SET **/
/* Standard function or processing efficient for some           */ /** SET **/
/* processing is applied.                                       */ /** SET **/
//#define MTL_MEM_FAR      /* Supports even external RAM area  */ /** SET **/
#define MTL_MEM_NEAR       /* Supports only internal RAM area  */ /** SET **/
```

Set only the above define statement and do not make any other modifications.

(6) Definition of software timer

Sets the internal software timer used.

Make this setting in accordance with the system.

The following reference values are obtained at 16.67-MHz operation without wait and when the instruction cache is disabled.

Note that the settings differ when the instruction cache is enabled and so that the setting should be made in accordance with the system.

```
/*---------------------------------------------------------------------- */
/* Define the counter value of the timer.                               */
/* Note: Calculated at 16.67-MHz operation.                             */
#define MTL_T_1US          28                      /* 1-us loop count      */
#define MTL_T_2US          64                      /* 2-us loop count      */
#define MTL_T_4US          138                     /* 4-us loop count      */
#define MTL_T_5US          174                     /* 5-us loop count      */
#define MTL_T_10US         358                     /* 10-us loop count     */
#define MTL_T_20US         724                     /* 20-us loop count     */
#define MTL_T_30US         1090                    /* 30-us loop count     */
#define MTL_T_50US         1823                    /* 50-us loop count     */
#define MTL_T_100US        3655                    /* 100-us loop count    */
#define MTL_T_200US        7320                    /* 200-us loop count    */
#define MTL_T_300US        10990                   /* 300-us loop count    */
#define MTL_T_400US        ( MTL_T_200US * 2 )     /* 400-us loop count    */
#define MTL_T_1MS          36650                   /* 1-ms loop count      */
//#define MTL_T_2MS        ( MTL_T_1MS * 2 )       /* 2-ms loop count      */
//#define MTL_T_5MS        ( MTL_T_1MS * 5 )       /* 5-ms loop count      */
```

## 2.5 Usage Notes

The sample programs show description examples in which the clock synchronous SCI is used.

When using another resource, set the software in accordance with the hardware.

## 2.6 Notes at Embedment

To embed the sample programs, include eep.h.

## 2.7 Usage of Another SuperH Family MCU

Usage of another SuperH family MCU is supported easily.

The following files must be prepared.

(1) I/O module common definition equivalent of eep_io.h.xxx
    Define the I/O pins to be used with reference to the SFR header of the MCU used.
(2) SFR common definition equivalent of eep_sfr.h.xxx
    Define the UART to be used with reference to the SFR header of the MCU used.
(3) Header definition equivalent of mtl_com.h.xxx
    Create and define a header for the MCU used.

Create the above files with reference to the provided programs.

In addition, specify the created header in eep_io.h, eep_sfr.h, and mtl_com.h.

## 2.8 File Configuration

| | | | |
|---|---|---|---|
| \com | <DIR> | | Directory for common functions |
| | mtl_com.c mtl_com.h | | Various definitions for common functions |
| | mtl_com.h.1650 | | Common header file |
| | mtl_com.h.1657 | | Common header file |
| | mtl_com.h.2378 | | Common header file |
| | mtl_com.h.3029 | | Common header file |
| | mtl_com.h.36049 | | Common header file |
| | mtl_com.h.38024 | | Common header file |
| | mtl_com.h.38076 | | Common header file |
| | mtl_com.h.7149 | | Common header file |
| | mtl_com.h.7206 | | Common header file |
| \drv | <DIR> | | Sample device driver directory |
| | \seep_spi <DIR> | | Serial EEPROM directory |
| | | eep.h | Driver common definition |
| | | eep_usr.c | Driver user I/F module |
| | | eep_io.c eep_io.h | I/O module |
| | | eep_io.h.1650 | I/O module common definition |
| | | eep_io.h.1657 | I/O module common definition |
| | | eep_io.h.2378 | I/O module common definition |
| | | eep_io.h.3029 | I/O module common definition |
| | | eep_io.h.36049 | I/O module common definition |
| | | eep_io.h.38024 | I/O module common definition |
| | | eep_io.h.38076 | I/O module common definition |
| | | eep_io.h.7149 | I/O module common definition |
| | | eep_io.h.7206 | I/O module common definition |
| | | eep_sfr.h | SFR common definition |
| | | eep_sfr.h.1650 | SFR common definition |
| | | eep_sfr.h.1657 | SFR common definition |
| | | eep_sfr.h.2378 | SFR common definition |
| | | eep_sfr.h.3029 | SFR common definition |
| | | eep_sfr.h.36049 | SFR common definition |
| | | eep_sfr.h.38024 | SFR common definition |
| | | eep_sfr.h.38076 | SFR common definition |
| | | eep_sfr.h.7149 | SFR common definition |
| | | eep_sfr.h.7206 | SFR common definition |
| \sample | <DIR> | | Sample program directory |
| | usr_tst tsk.c | | Sample program for operation verification<br>Use this for operation verification. |
| | tsk.c tsk.h | | Various definitions for common functions |
| | common.c common.h | | Various definitions for common functions |

## Revision Record

| Rev. | Date | Description | |
|---|---|---|---|
| | | Page | Summary |
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